1994

Management Sciences Division

Directorate of Plans
HQ Air Force Materiel Command
Wright-Patterson AFB OH 45433

FOREWORD

The Management Sciences Division (HQ AFMC/XPS) conducts and sponsors studies and research of significant materiel issues. Our focus is on the development, modification, and application of mathematical models which can help relate resource alternatives to the peacetime readiness and wartime sustainability of AFMC's customers--the operating commands.

This is our eleventh Annual Report. It includes descriptions of the projects we worked on in 1994 and our plan for 1995. If you have any comments, or suggestions for further research, contact us at DSN 787-3201 or commercial 513-257-3201.

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EXECUTIVE SUMMARY

The Management Sciences Division (HQ AFMC/XPS) conducts and sponsors studies and research of significant materiel issues. We use, modify, and develop new or improved methods, models, and tools to manage materiel resources.

Our goal is to quantify the relationships between alternative materiel resources and the resultant aircraft availability and sustainability so that AFMC can prioritize and justify its investments in those resources. We work toward this goal by performing studies for our customers and by pursuing a few internally developed projects which have significant potential for providing valuable insights into these relationships.

In 1994 we focused on several major areas. We assisted AFMC in allocating FY95 spares procurement funds by Air Logistics Center, weapon system, and item ("Banding"). This was a follow-on to our 1993 development work to minimize the negative impact on the Air Force's front line weapon systems. We continued our effort to help AFMC's Air Logistics Centers (ALCs) implement an approach which ensures that the items most in need of repair and/or distribution to support the operators' sortie generation capability will get priority attention ("DRIVE"). An interface with the Stock Control System that automatically releases requisitions was developed this year. Also, DRIVE was used to set base stock levels and support repair and distribution for the highly successful B-1B Operational Readiness Assessment. We contributed to an Air Force/AFMC initiative to improve repair, procurement, and distribution processes to simultaneously reduce resupply times and cut costs ("Lean Logistics"). We completed the development and implemented a method to assess AFMC's contribution to the operators' 180 day war fighting capability ("War Fighting Metrics"). We continued working with the Joint Logistics System Center (JLSC) to help define the appropriate multi-echelon spares requirements modeling strategies that will best satisfy the Components' needs ("JLSC Support"). We worked with the C-17 System Program Office to evaluate a number of maintenance alternatives for the C-17 engine and its modules ("C-17 Engine"). We established, and completed implementing, a program that will help senior operators better understand the capabilities and constraints of logistics support in a combat situation ("Logistics Enhanced Awareness Development").

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THE MANAGEMENT SCIENCES DIVISION

The function of the Management Sciences Division (HQ AFMC/XPS) is to provide a source of operations research skills for the Headquarters. Although we are a part of the Directorate of Plans, we often perform our studies and analyses for clients outside the Directorate.

The majority of our analysts have advanced degrees in technical areas such as operations research, mathematics, engineering, and management sciences. Each new analyst is expected to have, or obtain within a three to four year training period, an appropriate advanced degree.

Our emphasis has been on the application of mathematical modeling techniques to improve the management of materiel resources. We have focused our efforts on the development and enhancement of mathematical models which can relate materiel resource decisions to resultant impacts on aircraft availability so that AFMC can prioritize and justify its investments in those resources. We work toward accomplishing this by performing studies for our customers and by pursuing a few internally developed projects which have significant potential for providing valuable insights into these relationships. The Division works closely, and shares results, with other governmental and private analysis organizations.

We actively assist the AFMC staff and other Air Force agencies in incorporating improved methodologies in their management of materiel resources. We are organized into two Functions. The Analytic Applications Function is focusing on issues involving the requirements computation of peacetime and wartime recoverable item spares, the prioritization of repair and distribution actions needed to execute materiel support, and the assessment of weapon system capability due to the support actions taken. The Function's staffing consists of seven operations research analysts and a logistics staff officer. The Concept Development Function is focusing on new initiatives such as developing a prototype peacetime assessment capability for non-aircraft Command Control Communication Computer Intelligence (C4I) reparable items and identifying workload drivers for depot maintenance operations in the Air Logistics Centers. The Function's staffing consists of eight operations research analysts.

Within the Division, we have the Air Force technical responsibility for three recoverable item spares requirements models. The Aircraft Availability Model (AAM) is embedded in the Recoverable Item Requirements System (D041). It incorporates aircraft availability objectives into the computation process for peacetime operating stock. The Dyna-METRIC model is the wartime capability tool used by the Sustainability Assessment Module (SAM) of the Weapon System Management Information System (WSMIS). The Aircraft Sustainability Model (ASM) is the computational technique employed by WSMIS/ REALM to identify wartime spares requirements

We also have the technical responsibility for the Distribution and Repair In Variable Environments (DRIVE) model. This model is being used to prioritize the repair and distribution of recoverable items based upon the marginal gain in operational capability.

Another model we use is the JEMS (Jet Engine Management Simulator) to evaluate issues related to the management of aircraft engines.

The next two sections of this report contain specifics of our 1994 accomplishments and our planned program for 1995.

ACCOMPLISHMENTS IN 1994

In 1994 we focused on several major areas. We assisted AFMC in allocating FY95 spares procurement funds by Air Logistics Center, weapon system, and item. This was a follow-on to our 1993 development work to minimize the negative impact on the Air Force's front line weapon systems. We continued our effort to help AFMC's Air Logistics Centers (ALCs) implement an approach which ensures that the items most in need of repair and/or distribution to support the operators' sortie generation capability will get priority attention ("DRIVE"). An interface with the Stock Control System that automatically releases requisitions was developed this year. Also, DRIVE was used to set base stock levels and support repair and distribution for the highly successful B-1B Operational Readiness Assessment. We contributed to an Air Force/AFMC initiative to improve repair, procurement, and distribution processes to simultaneously reduce resupply times and cut costs ("Lean Logistics"). We completed the development and implemented a method to assess AFMC's contribution to the operators' 180 day war fighting capability ("War Fighting Metrics"). We continued working with the Joint Logistics System Center (JLSC) to help define the appropriate multi-echelon spares requirements modeling strategies that will best satisfy the Components' needs ("JLSC Support"). We worked with the C-17 System Program Office to evaluate a number of maintenance alternatives for the C-17 engine and its modules ("C-17 Engine"). We established, and completed implementing, a program that will help senior operators better understand the capabilities and constraints of logistics support in a combat situation ("Logistics Enhanced Awareness Development").

In addition to these major areas, the following descriptions of our 1994 accomplishments include numerous other analysis issues we worked.

TITLE: *War Fighting Metrics for AFMC*

CUSTOMER: HQ AFMC/XP-AO, HQ AFMC/LGI

OBJECTIVE: Help AFMC determine its ability to provide required wartime logistics support to the operating forces and provide a convenient means to track the indicators of support at regular intervals. Indicators of AFMC's contribution to wartime mission effectiveness are desired at high levels (e.g., HORIZONS). They are also useful for MAJCOMS, System Program Directors (SPDs), and item managers.

RESULTS: Last year we developed an Initial Operating Capability (IOC) War Fighting Metric system which translates data from Production DRIVE into sorties for a 6-month war. The system applies DRIVE, Dyna-METRIC, and several Commercial-Off-The-Shelf (COTS) computer programs to generate capability assessments for all weapon systems in a few hours on a PC.

In 1994 we generated the War Fighting Metrics products and delivered them to HQ AFMC/XP-AO. XP-AO then provided the weapon system assessments to SPDs. A majority of the SPDs chose to use the War Fighting Metrics in formulating their input for HORIZONs. In lieu of this automated approach, each SPD would have had to come up with a subjective estimate of his or her weapon system's ability to support a 6-month war.

Additionally, we gave Defense Logistics Agency (DLA) several of our War Fighting Metrics data files so that they may add Consumable LRUs (CLRU) and estimate the impact of their support. DLA is building a consumable assessment system which will model a war lasting up to 6 months.

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TITLE: *Assessing the Effect of Two Levels of Maintenance (2LM) During War*

CUSTOMER: HQ AFMC/XP-AO, HQ AFMC/LGI, SPDs

OBJECTIVE: Provide information to SPDs to help them determine if regional maintenance is necessary in order for 2LM to be an effective and sufficient support concept; also, help them identify the items which require regional maintenance.

RESULTS: We modified our War Fighting Metrics model to show the effect of 2LM factors on wartime sortie generation capability. Given expected demand rates and depot resupply times, our results indicate that 2LM does not need to be augmented by regional maintenance for A-10, B-1, B-52, C-5, C-130, C-141, E-3, F-15, F-16, F-111, and KC-135 aircraft.

We also developed and delivered to SPDs a spreadsheet program which calculates the required depot resupply time (RRT) for an aircraft component. This tool enabled SPDs to analyze individual items to see the expected impact of 2LM during war. HQ AFMC/LGI had stated that RRTs of 16 days or greater are acceptable. Only a few of the parts which were evaluated were found to have unachievable RRTs (less than 16 days). For those parts, the spreadsheet program calculated the item's contribution to aircraft Total Not Mission Capable Supply (TNMCS), assuming that resupply will take 16 days. All of the TNMCS levels were observed to be acceptable (within the range of the Designed Support Objective), and thus, none of the parts were likely to need regional maintenance.

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TITLE: *RSD Banding for Effectiveness*

CUSTOMER: HQ AFMC/LG/FM/DR

OBJECTIVE: Assist AFMC in allocating its 1995 Obligation Authority (OA) by ALC and Weapon System and provide item level guidance to the Reparable Stock Division (RSD) item managers.

RESULTS: We modified and applied the methodology developed last year to produce a constrained requirement which matched the $555 million OA. This dollar distribution was incorporated in the Annual Operating Budget (AOB) Schedule Number 1 which HQ AFMC sent out on 30 Sep 1994. The following week a modified dollar distribution was sent out to correct for the erroneous inclusion of a class of RSD items which were never intended to be purchased. This project will be ongoing until the production requirements system is upgraded to handle severe funding shortfalls.

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TITLE: *Impact of 65% Cap on RSD Procurement Obligation Authority*

CUSTOMER: HQ AFMC/FM/LG

OBJECTIVE: Determine if the 65% congressionally imposed cap on spending is hurting Air Force support of weapon systems.

RESULTS: Congress has imposed a cap on new procurement which is equal to 65% of stock fund sales. We developed a metric that examines the ratios of support from repair to support from procurement and repair cost to procurement cost. These ratios determine if the 65% cap is a problem. This simple metric shows that AFMC is not being hurt by the cap as it is currently being imposed.

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TITLE: *Distribution and Repair in Variable Environments (DRIVE) Support*

CUSTOMER: HQ AFMC/LGI/XPS, ALCs, MAJCOMs

OBJECTIVE: Support the implementation of the AFMC DRIVE Production System which includes the D087J/K mainframe system and DeskTop DRIVE (now called the DRIVE Distribution Module). DRIVE is being implemented to closely link recoverable item depot repair and distribution actions to operational customers' needs. The benefits are that we can make better use of available spares and depot resources to satisfy customer support requirements in both peacetime and wartime. We are the Air Force technical OPR for the DRIVE model and technical consultant to both the DRIVE Functional Office and Program Management Office.

RESULTS: In 1994, we designed and implemented a number of modifications to the DRIVE model. These included MICAP logic options, added checks on data such as RSP requirements and retail level setting options. We also developed a research version with base-depot trade-off logic suggested by related RAND work. We also prepared a working paper giving users descriptions and recommendations for which model parameters to use in their applications.

We completed and documented several DRIVE analyses. These included an improved method for forecasting Foreign Military Sales (FMS) demands on DRIVE, D035C in-transit asset data analysis, impacts of multiple QPA vs. single QPA aircraft on DRIVE recommendations, and an analysis of which B-1B items were included in the DRIVE data base. We worked on a number of implementation and enhancement issues with the development contractor and ALC and MAJCOM users of DeskTop DRIVE. Implemented changes included the capability to recognize dual organic Sources of Repair (SOR), adding items which have failure patterns based on programs other than flying hours and retail level setting options within the DeskTop DRIVE environment.

We participated in a design effort to automate DRIVE distribution to take advantage of the waiver OSD granted for DRIVE to replace the standard UMMIPS system for allocating assets to Air Force customers (covered in the *Automating DRIVE Distribution* section). We also worked closely with our functional sponsor to design and document DRIVE system changes to include both non-aircraft items and lower indentured items (below level 2). These changes are scheduled for 1995.

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TITLE: *Automating DRIVE Distribution*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Develop a system to automatically release or ship items from the depot according to DRIVE priorities. The automated release will reduce user workload, increase acceptance of DRIVE priorities and, ultimately, as shown through numerous studies and field exercises, improve weapon system availability.

RESULTS: OSD previously granted the Air Force a waiver to use DRIVE distribution priorities in lieu of the normal requisition priorities from the Uniform Material Movement and Issue Priority System (UMMIPS). The preferred approach to automate DRIVE distribution was to implement changes in the Stock Control System (D035A). However, because of limitations on changing the Stock Control System imposed by the JLSC, an alternative approach was chosen to automate DRIVE distribution at each ALC. The approach uses a system made up of DeskTop DRIVE married to an Item Manager (IM) emulator developed by OO-ALC. This combination is called the DRIVE Distribution Module (DDM) and is run daily. Basically, the DRIVE distribution recommendations are matched to the actual requisitions in D035 which are then filled through the IM emulator either by shipments of serviceables from the depot warehouse or by prepositioning the requisitions so that they are filled as serviceables come into central receiving from either organic or contractor repair. We participated in system design meetings with the functional OPR and software contractors. We also provided a great deal of systems analysis support to guide the software developers so that the OSD and AF guidelines were met. After the initial OO-ALC and OC-ALC prototypes were fielded, we conducted system evaluations at those ALCs. The evaluations identified several data and software deficiencies, many of which have already been corrected with the others scheduled as part of the 1995 implementation effort. At the end of 1994, we were supporting the implementation of DDM at WR-ALC (LANTIRN and ALQ-135 band 3 items), OC-ALC (B-1B items), and OO-ALC (F-16 avionics items).

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TITLE: *B1-B Operational Readiness Assessment (ORA) Support*

CUSTOMER: HQ ACC/LGS, OC-ALC/FMI/LAB, HQ AFMC/LGI

OBJECTIVE: The Air Combat Command (ACC) performed a field test of the B-1B at Congressional request to show the readiness capabilities of the aircraft. DRIVE was one of the model tools ACC and AFMC used to provide logistics support during the test.

RESULTS: We acted as technical consultants in the use of DRIVE for both retail level setting and ALC repair and distribution prioritization. We worked with the ACC staff to help with their DRIVE training and to isolate potential data problems. We also worked with OC-ALC personnel to help guide their use of DRIVE for repair and distribution prioritization. Finally, we made model modifications and participated in the effort to use DRIVE for setting B-1B retail stockage levels (discussed under the *Retail Level Setting* project) The B-1B met its readiness targets and we attribute that in part to DRIVE's use.

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TITLE: *Lean Logistics*

CUSTOMER: HQ AFMC/LG-LL

OBJECTIVE: Lean Logistics is an Air Force initiative to speed up the repair, procurement, and transportation processes to provide better support to the end users at the lowest possible cost. All process improvements developed under the Two-Level Maintenance initiative will be incorporated or further developed under Lean Logistics.

RESULTS: This year we supported this initiative in a couple of ways. One of the ideas for reducing resupply times under Lean Logistics involves a buffer stock concept of pulling most of the peacetime stock back from the bases into a centralized buffer with very fast transportation back to the bases as needed. This stockage buffer would both supply the base users and act as a controlling mechanism for depot repair activities. This buffer is presently called the Consolidated Serviceable Inventory (CSI). We began a project to explore the impacts on aircraft availability using this CSI concept and to recommend alternative ways to compute and manage the CSI stock levels. We also participated in the continuing struggle to determine whether and how the DRIVE model can be used to help the aims of Lean Logistics.

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TITLE: *Logistics Enhancement Awareness Development (LEAD) Modified Seminar Wargame*

CUSTOMER: HQ AFMC/XP

OBJECTIVE: Establish a program to emphasize wartime logistics to senior operational command officers and enhance logistics representation within current wargames.

RESULTS: During 1994 the 12AF (ACC), the 15AF and 21AF (AMC) participated in LEAD seminars chaired by their respective commanders. The Air Force Wargaming Institute hosted a LEAD workshop for ACSC faculty and students. As a result of this workshop additional LEAD workshops are being planned for ACSC curriculum.

Attendees at the AMC seminars included the C-5, C-141, and C-135 SPDs, along with representatives from AFMC, PACAF, CENTCOM, and ACC. Representatives from the F-15, F-16 and B-52 SPOs attended the ACC seminar, along with personnel from AFMC, AMC and PACAF.

The seminars covered logistics issues beginning with a pre-war build-up, through war and reconstitution actions at the end of the war with emphasis on pre-war and post-war logistics activities. The seminars featured dual major regions of conflicts (MRCs), an Egyptian and a Korean scenario, that constrained the resources available to either MRC. Mini-briefs covering current logistics issues, e.g., 2-Levels of Maintenance and Lean Logistics were given by functional experts and weapon system briefings by the SPDs were included during the seminars. Each seminar ended with a "hot-wash" discussion among the participants summarizing the issues raised during the seminar.

Based on the positive feedback from the seminar participants, the LEAD contract, through KAPOS and Associates, was extended into a second year, with an option remaining for a third year. At the beginning of the second year contract responsibility transitioned from HQ AFMC/XPS to HQ AFMC/XP-AO.

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TITLE: *Joint Logistics Support Center (JLSC) Requirements Analysis Support*

CUSTOMER: HQ AFMC/LGI, JLSC/MMD

OBJECTIVE: To provide modeling support to the JLSC. XPS is providing the official Air Force expertise on math models used to compute spare parts requirements. The JLSC objective is to consolidate all computer processes for DoD requirements to one system (or one set of systems) that can be easily maintained by one organization.

RESULTS: To begin the year, we were concerned with the approach for handling Air Force recoverable items. The JLSC has decided that these items would be computed under Simultaneous Multi-Echelon Multi-Indenture Computation (SMMC - formerly RDB Recoverables), separate from the JLSC initiative of multi-link. However, we continued to give support to the development of multi-link, providing discussions on such Air Force approaches as the handling of common items and the use of assets, particularly assets in long supply, in our requirements computations.

At the request of the JLSC, we began an analysis of the Navy's Aviation Retail Requirements Oriented to Weapon Replaceable Assemblies (ARROWs) model. This is a readiness based retail requirements model that will be used for initial requirements determination (IRD). This analysis was made against the current Air Force approach for IRD, AFMCI 57-27. Preliminary analysis does show that as expected, the readiness based ARROWs will perform better than the current Air Force approach which is not readiness based.

At the end of the year, we contributed to the CY 95 Statement of Work (SOW) for the Operations Research Group (ORG). This SOW defines all tasks that will be performed in 1995, including deliverables due to the JLSC and the ORG. Throughout the year, we have contributed to the work of the ORG, providing support and feedback on various projects conducted by the other components.

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TITLE: *Analysis of C-17 Engine and Module Maintenance Locations*

CUSTOMER: ASC/YCL (C-17 SPO)

OBJECTIVES: To evaluate the following maintenance location options for the C-17 engine and its modules.

Organic depot engine/module repair with two module replacement centers (MRCs)
Organic depot with one AMC MRC and an MRC collocated at the depot
Organic depot with an MRC collocated at the depot
Contractor logistics support (CLS) depot with two MRCs
CLS depot with collocated MRC
CLS depot with no MRC (all engines repaired at depot)

RESULTS: Preliminary results were provided to the customer in the form of a technical report in June, 1994. Our results show the best maintenance options for the 110 PAA are either the organic or CLS depot with two AMC MRCs. The best options for the 40 PAA are either the organic or CLS depot with one AMC MRC. Further analysis is required to determine whether the organic or the CLS maintenance alternative is the best.

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TITLE: *SSD BANDING*

CUSTOMER: HQ AFMC/FMR

OBJECTIVE: Develop a systematic process to aid AFMC in distributing limited Obligation Authority (OA) for System Support Division (SSD) items.

RESULTS: AFMC developed levels of support (bands) that placed weapon systems in groups according to a MAJCOM coordinated priority. We developed an algorithm that gave higher band items a higher percent of funding than lower banded items. The algorithm let management determine what kind of variation in funding would be allocated based on the amount of obligation authority available. Past funding and health of the weapon systems was not considered. This method was used on "consumable" items (SSD) only.

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TITLE: *Analysis of Inventory Investment Cost and Performance for Alternative Requirements Computation Approaches*

CUSTOMER: AF/LGSS

OBJECTIVE: Provide insight into the impact on inventory investment and weapon system availability of using two different computation approaches. One approach uses a single computation of the world-wide wholesale/retail requirement as is done by the Aircraft Availability Model (AAM). The other approach uses separate retail and wholesale spares computations summed to yield the total world-wide requirement.

RESULTS: We computed the world-wide requirement to achieve a given aircraft availability for three weapon systems, the C-5, C-130, and F-15, under both the single requirement computation approach and the separate requirement computation approach. For the single approach, we used the AAM. For the separate approach, we developed a model to compute the depot requirement and used the Dyna-METRIC model to compute the retail requirement while maintaining a given depot delay time. We then compared the resulting investment cost. Our results showed that the single requirement computation approach of the AAM resulted in a smaller inventory investment for the same aircraft availability.

We advised the customer that the Air Force should resist changing to the type of sub-optimal spares computation represented by the separate retail and wholesale spares computation approach.

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TITLE: *Comparison Study Between RDB Forecasting and Navy Statistical Demand Forecasting*

CUSTOMER: HQ AFMC/LGIW, JLSC/MMD

OBJECTIVES: Compare the forecasting accuracy and performance of the Navy Statistical Demand Forecasting (SDF) system to the Air Force Requirements Data Bank (RDB) forecasting system in an Air Force environment.

RESULTS: The study demonstrated that the systems generate forecasts that will provide relatively the same level of forecasting accuracy and/or aircraft availability in an Air Force environment. The SDF system performs better in detecting outliers and trending component data. It was found, however, that with actual Air Force data, the SDF system and the RDB system generate forecasts with approximately the same level of accuracy. These results demonstrate that the systems generate forecasts that will provide about the same level of aircraft availability. The implications are that the ease of use and cost of implementing or operating one system versus the other may be the appropriate determinant in the final selection.

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TITLE: *Forecasting NRTS and Demand Rates*

CUSTOMER: OO-ALC

OBJECTIVE: Determine an appropriate forecasting technique(s) for improving demand and NRTS rates by comparing several different techniques and measuring errors. Develop a tool for analysts at OO-ALC to use, so they can forecast using the best method.

RESULTS: We tested several techniques including eight-quarter moving average, linear regression analysis, and double exponential smoothing, and determined that double exponential smoothing provided the most accurate forecasts although it provided only a small improvement over moving average methods. We plan to conclude this study early next year by developing a forecasting tool for OO-ALC.

We anticipate the completion of this project by June of 1995.

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TITLE: *DRIVE/D041 Dirty Data Cleanup*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Improve the quality of data being fed to DRIVE and D041 from other automated computer systems.

RESULTS: There were three major areas where data cleanups were initiated because of our investigation and analysis. In all of these instances, not only DRIVE and D041 but other systems benefited from improving the data. The first area concerned the D035C in-transit serviceable asset data. This data has been extremely inaccurate (too high) for years. DRIVE would not repair and distribute enough assets when it saw high numbers of serviceable assets in-transit to the bases. Also, the item managers spent hours on file maintenance to correct this data after it was passed to D041 so that the D041 buy and repair requirements would be accurate. We compared the D035C in-transit data to base-level data and presented the evidence that the numbers were too high to the D035C OPR and the D035C programmers. They corrected their software problems and the data is now greatly improved.

The second area concerned our discovery that the equipment specialists did not always use the subgroup master LRU NSN as the next higher assembly for SRUs in the D041 application files. They sometimes used the NSN of a part that was interchangeable with the subgroup master NSN. This meant that some SRUs were partially or totally omitted from both the DRIVE and D041 data bases since both systems work at the subgroup master level. We quantified how often this situation occurred and convinced the D041 OPR that their system was suffering as well as DRIVE. The D041 OPR sent out lists of the erroneous data and guidance on how to correct it to all equipment specialists.

The final major data clean-up we initiated concerned D041 program element codes. While trying to determine why a number of WR-ALC managed F-15 items were showing up in DRIVE as applying to the B-52, we discovered that there was a table buried in the D041 system that links program element codes to weapon systems. These items were linked to a program element code rather than directly to a weapon system. It turned out that the table had not been updated recently. This has been adversely affecting the D041 buy and repair computations as well as DRIVE. The D041 OPR agreed to resume maintaining the table.

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TITLE: *Retail Stockage Levels for the Air Force*

CUSTOMER: HQ AFMC/LGI, MAJCOM/LGS

OBJECTIVE: To compute improved retail stockage levels.

RESULTS: The Central Leveling System (D028) no longer computes retail stockage levels so the Standard Base Supply System is the only method in use. We worked to (1) participate in the B-1B retail level setting effort (using DRIVE) by playing a technical consulting role and developing needed model modifications; (2) support an analysis effort by RAND to investigate alternative approaches for setting levels including DRIVE, Aircraft Availability Model (AAM), and Dyna-METRIC; and (3) broadening Air Force involvement by the AFLMA in level setting efforts. The B-1B effort was a success, the RAND research provided valuable insights to improve current Air Force retail level setting methodologies and, with our involvement, AFLMA personnel were considering applying the DRIVE model to level setting for one of the Lean Logistics implementations. We will continue this effort in 1995.

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TITLE: *FMS Repair Forecasting Approach*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Determine the best approach to use for forecasting Foreign Military Sales (FMS) repair demands and help define the flow of data from the Security Assistance Management Information System (SAMIS) to production DRIVE.

RESULTS: FMS repair demands are often highly variable across time. This analysis examined if DRIVE should use the SAMIS sixteen-quarter weighted average technique or some other technique for forecasting FMS repair demands. Three years of data were used to compare the SAMIS technique with five other approaches: four-quarter moving average, eight-quarter moving average, single exponential smoothing, double exponential smoothing, and Winter's Model. Forecasting errors were computed for each technique using both the actual data and data where the outliers were reduced to damped values. The AFSAC sixteen quarter weighted average technique performed best in both cases. We recommended DRIVE obtain its forecasted FMS repair demands from SAMIS.

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TITLE: *Readiness Based Initial Requirements Determination (RBIRD)*

CUSTOMER: SA-ALC/LFTE

OBJECTIVE: Apply readiness based sparing (RBS) to foreign military sales (FMS).

RESULTS: In 1994, we delivered RBIRD to the customer. RBIRD is a readiness based spares requirements system that we adapted to calculate spares quantities for foreign military sales. RBIRD had originally been developed for initial provisioning of recoverable items. Upon delivery of the system, we performed several successful tests using actual data and then developed a plan for incorporating RBIRD into the International Weapon Item Projection System (IWIPS). The IWIPS is the current FMS reparable sparing model used at SA-ALC. RBIRD calculates spares levels that should provide for improved aircraft availability compared to the demand-based computation currently employed by IWIPS.

Based on suggestions provided by the customer, we modified and enhanced the system so that it is ready for full implementation within the IWIPS. Benefits of the system include spares cost savings, inventory reduction, and improved aircraft availability.

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TITLE: *Demand Function Analysis*

CUSTOMER: HQ AFMC/XPS, HQ USAF/LGSI

OBJECTIVE: Investigate whether demands for aircraft recoverable spares are either a function of flying hours, sorties, landings, or some combination of the three.

RESULTS: In 1993, we became familiar with the Air Force's Reliability and Maintainability Management Information System (REMIS) and collected flying program and aircraft status data for all aircraft in the inventory for the past 3 years. We also obtained D041 quarterly demand data for the same period. Our data collection included the Desert Shield/Storm experience which gave us a full range of aircraft utilization rates.

In 1994, we imported C-5, F-16, T-38 and F-15 data into Excel spreadsheets and performed several regression analyses. We had hoped to find strong relationships with one of the factors, especially at the quarterly level, but results were inconclusive. Flying hours were found to be no better or no worse than the other factors.

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TITLE: *Depot Repair Cycle Time Analysis*

CUSTOMER: HQ AFMC/LG

OBJECTIVE: HQ AFMC/LG wanted us to look at all reparable NSNs in the depot repair pipelines and focus attention on specific NSNs in the depot repair pipelines that would benefit from improved repair practices. We also focused on reparable items in a buy position according to the March 1994 Central Secondary Item Stratification (CSIS) data, and what those items' repair cycle times looked like.

RESULTS: The analysis of over 94,000 items in the D041 production system revealed that over 11,000 reparable NSNs were in the Depot Repair pipelines. We also discovered that over 1,200 of these items were in a "buy". By looking at total repair costs and total procurement costs, we were able to provide to LG two lists (of the top 100 items) to focus attention on with regards to total procurement value and total repair costs.

ANALYSTS: William Morgan
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TITLE: *Implementation of the SDF Exponential Smoothing Forecasting Technique in RDB*

CUSTOMER: JLSC/MMD, HQ AFMC/LGI

OBJECTIVE: Investigate the possibility of implementing the Navy's Double Exponential Smoothing technique in the Requirements Data Bank system to forecast Air Force organizational and intermediate maintenance demand rates.

RESULTS: We found that the Double Exponential Smoothing technique developed by the Navy actually differed from the theoretical Double Exponential Technique. It was originally developed for the Defense Logistics Agency to apply to a unique set of circumstances and was named Double Exponential Smoothing. We found that although it would be possible to implement the technique in the RDB, it did not meet the requirements of the Air Force. This information was provided to our customers.

ANALYST: Capt Christian Dussault
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TITLE: *LANTIRN Demand Data Analysis*

CUSTOMER: LANTIRN SPO

OBJECTIVE: Help the LANTIRN SPO determine the spare part cost associated with bringing LANTIRN FMC rates up to the 85% peacetime availability target. LANTIRN or Low Altitude Navigation Targeting InfraRed for Night consists of two pods which attach to some F-15E and F-16 aircraft. The development contractor provided the SPO with one estimate of the spares requirement. AFMC's D041 system provided another estimate of the spares computation. We were asked to review the contractor's computation and compare it to the D041 computation to determine which was more reasonable as a quick estimate of the required funding.

RESULTS: The contractor used a pipeline calculation with a fixed safety level. While we do not agree that a fixed safety level would be the best approach, we did not find any errors in their math. When we compared their computed requirement to the D041 computed requirement for these parts we found that D041 suggested spending only about 25% as much as their method spent. Further, the range of LANTIRN parts and the item data did not match well between the two systems. The SPO investigated and determined that the D041 data were far less accurate than the contractor's, probably because the LANTIRN had only recently transitioned to organic maintenance and data clean-up had not yet been accomplished.

Much later in the year, at the SPO's request, we provided a list of the top ten field return (highest NRTS plus condemnation) LANTIRN items, as reported in the most recent D041 quarterly data. In the quarter ending in June 1994, the top ten items placed from 7 to 19 demands on the depot.

The results described above were presented to the SPO in white papers.

ANALYSTS: Michael Niklas
William Morgan
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TITLE: *Analysis of Conformance Verification Program (CVP) Data*

CUSTOMER: HQ AFMC/ENM

OBJECTIVE: HQ AFMC/EN developed the CVP several years ago to determine the quality of spare parts entering the Air Force inventory. Testing is done by each Air Logistics Center on a random sampling as well as on a pre-selected item basis. The tasking to XPS was to provide to HQ AFMC/EN statistical analysis, including confidence levels and tests of hypothesis, of the AFMC-wide data.

RESULTS: Two analyses have been performed by XPS. The initial analysis was conducted during the last quarter of CY 93 and documented in XPS Technical Report #93-293, February 1994. A follow-on analysis was conducted on FY 94 data and will be documented in an XPS Technical Report in January 1995. In general the quality of parts has improved both with regard to contract conformance and the serviceability of the parts.

Work on this project will continue in 1995.

ANALYST: Don Casey
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TITLE: *Evaluation of the Logistics Assessment Models (LAMs)*

CUSTOMER: HQ USAF/LGS

OBJECTIVE: Develop and maintain expertise within AFMC on the technical aspects of the LAMs being developed by the Air Staff. Provide ongoing independent evaluation of LAMs given the following applications: Sustainability assessments for the Program Objective Memorandum (POM), Sustainability assessments for Weapon System Program Assessment Reviews (WSPARs), Sustainability assessments for use in preparation of Weapon System Master Plans, and as a measure of providing logistics constraints to sortie production in war fighting simulation models.

RESULTS: The documented evaluation of the LAMs affords the user the opportunity to judge LAMs applicability for a given assessment. The baseline evaluation of LAMs was crucial in revising the current windows version of the model, called WINLAM.

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TITLE: *D041 Data Extraction*

CUSTOMER: HQ AFMC/LGII, HQ USAF/PEY, HQ AFMC/LGP

OBJECTIVE: To support organizations' requests to obtain Depot databank information.

RESULTS: The GAO requested that HQ AFMC/LG provide Depot Maintenance information on the top five engines, airframes, and Depot Level Reparables in D041 for the last five years. Due to the vast amount of data and the time period requested, HQ AFMC/LG asked XPS to created a process that could efficiently gather all the required information and supply it in a usable medium to HQ AFMC/LG. We collected the D041 Depot Database information for the past five years and analyzed the inventory level for Depot level Reparables based upon item specific listings. We computed the top five Depot level Reparables for each aircraft type from D041 in terms of total dollar value and total inventory each year for the past five years.

Other requests included USAF/PEY's request for F-16 demand factors, rates and other data from 1982 to 1992, and a request for depot repair data from HQ AFMC/LGP. All requests for data were fulfilled with the necessary information being provided in a customer designated format.

ANALYSTS: 1Lt Robert Block
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TITLE: *Project 136*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Project 136 was an Air Force initiative begun in 1993 to improve the wartime reparable parts status of the C-5 and the C-141. Debate centered on how much improvement to wartime parts levels would constitute enough and if improvement was feasible with current assets (serviceable/unserviceable) in the system.

RESULTS: We computed the costs to repair enough carcasses to totally fill the current C-5 and C-141 wartime spare levels. We also identified the stock numbers that are carcass-short (we would have to procure additional assets). We determined, by item level, which assets we could repair our way to health, and which assets could not be totally cured by repair alone. This involved work with AMC and WR-ALC sharing their top problem part information. The results of this effort were briefed by HQ AFMC/LGI to HQ AMC/CC.

ANALYSTS: 1Lt Robert Block
Barbara Wieland
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TITLE: *Statistical Consulting Support*

CUSTOMER: AFMC Headquarters Staff

OBJECTIVE: Provide a resource for use by all Headquarters organizations for consultation on statistical analysis. These "projects" range from short term (1-2 hours) to projects of several days and/or 1-2 hours (days) periodically over a several month period.

RESULTS: Our efforts this year include:

a) Assisted HQ AFMC/DRI in establishing the sample size and method of taking a random sample to produce the confidence level and precision level desired for a survey of personnel attitudes.

b) Assisted XPV in developing a spreadsheet for their use to record and tabulate Integrated Product Development survey results.

c) Assisted HQ AFMC/EN in helping the IG develop a personnel survey with clear, concise language. Helped eliminate many multi-part questions and ambiguous terms that could cause each person taking the survey to interpret the questions differently.

Work will continue throughout 1995.

ANALYST: Don Casey
(513) 257-7408; DSN 787-7408

TITLE: *Integrated Product Development*

CUSTOMER: HQ AFMC/DRI

OBJECTIVE: Determine to what extent Integrated Product Development (IPD) has become a way of life in AFMC. IPD is a: "A philosophy that systematically employs a teaming of functional disciplines to integrate and concurrently apply all necessary processes to produce an effective and efficient product that satisfies customer's needs." (AFMCP 800-60, 1 October 1993).

RESULTS: XPS was a member of the Metrics Team. The goal of the team was to assess how well we have progressed toward implementing the Integrated Product Development philosophy in our daily business. A survey was prepared based on the DOD survey "Guide For Assessing Organizational Performance" and analysis was performed at six month intervals. Results from the most recent survey indicate that IPD is institutionalized enough that annual surveys should be sufficient.

This project was completed in January 1995.

ANALYST: Don Casey
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TITLE: *XPS Sun Computing Resource*

CUSTOMER: HQ AFMC/XPS

OBJECTIVE: Set up and maintain a network of Sun Workstations in XPS to provide shared data-storage and computing resources not otherwise available to XPS analysts.

RESULTS: Linked together the three stand-alone workstations on a network segment, allowing users at the five special graphics terminals access to any of the three workstations. Also linked the XPS Sun network segment to the general headquarters network permitting all XPS analysts easy access to these resources from their desktop PCs.

Work will continue into 1995.

ANALYSTS: James S. Bankey
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TITLE: *Statistical Sampling of Library Usage*

CUSTOMER: HQ AFMC/SVPL

OBJECTIVE: To determine and build an appropriate sampling method to use for collecting statistics on the number of people using AFMC libraries and the numbers of various types of resources which are checked out. Historically, this data has been collected every day and summarized for inclusion in Command/USAF-directed reports.

RESULTS: Using prior analyses of historical data from libraries at AFMC Air Logistics Centers, we created a sampling-based database system to perform the necessary calculations to produce information required to be included in Command/USAF-directed reports. We believe each library need only collect data once per week, however, they can collect it as often as they want. We analyzed the results of the live-data test and presented the results and our conclusions to the Command Librarian (SVPL). If they accept our analysis of the testing results, we will distribute the sampling-based database system to selected AFMC libraries providing them with a streamlined method of collecting required usage data and providing results to the Command Librarian.

This project will continue into 1995.

ANALYSTS: James S. Bankey
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TITLE: *Support for the Development and Implementation of WSMIS*

CUSTOMER: HQ AFMC/LGI, MSG/SXM, MAJCOMs, HQ USAF/LGSS

OBJECTIVE: Improve the quality and usefulness of the Weapon System Management Information System (WSMIS) by designing enhancements and solving technical problems. Take an active role in providing technical assistance to the WSMIS functional management office, the WSMIS Program Office, the development contractors and users of the system.

RESULTS: Our efforts this year were directed primarily at data issues and small PAA capability assessments. At the request of USAF/LGSS, we prepared several reports which identify low demand items in the Readiness Spares Packages. LGSS is looking for ways of streamlining how Combat Supplies Management System information is input to WSMIS, thereby improving manageability and electronic data transmission. Additionally, we investigated problems with capability assessments of small PAA units. "Small PAA" generally refers to bases which support fewer than 8 aircraft. We conducted a working session (with MAJCOM and Air Staff representation) at which we explained the issues and proposed long and short term solutions. LGSS asked us to test the proposals using WSMIS/SAM unit level assessment data. Results of those tests will be available in 1995.

ANALYSTS: Michael Niklas
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TITLE: *Depot Asset and Usage Data Analysis from Wholesale Data Interfaces*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Provide analysis to a cross functional team consisting of members from XP, LG, SC, and each ALC. As a member of the Requirements Interface Process Improvement Team (RIPIT), we are responsible for the analysis of all data received from the various systems that feed into the Recoverable Consumption Item Requirements System (D041), starting with the Wholesale and Retail Receiving and Shipping Process (D035K).

RESULTS: We had ended our involvement with this project, but at the request of our customer, continued to perform analysis work and data manipulation on an as needed basis. The team has maintained a metric concerning the accuracy of data being passed to D041 and our office continues to build that metric on a quarterly basis. We were asked to build a product that can be sent to the ALCs for their use in file maintenance. This product corrected a D104 print product that contained errors from negative numbers being passed through the system. Through the year, we have been involved in various analyses of system interface problems, one such problem concerning usage data from D035A being shifted over two positions on a data feed. Our analysis in this area was used as verification of a correction by the contractor. Most of the work under this project was the support that we provided to the Air Force Audit Agency (AFAA). Through a request from LGI, we provided some analysis to the AFAA, but mainly provided results from various programs that already existed from work we have done in the past. The AFAA was looking at the accuracy of data being fed all the way to the Central Secondary Item Stratification (CSIS). Our programs were set up to look at the data feeds for each system from D035A to D041, before file maintenance.

ANALYSTS: William Morgan
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THE PROGRAM FOR 1995

Our major areas for 1995 will include a continued refinement of the allocation of funding (Obligation Authority) to the Air Logistics Centers by weapon system and by item. We expect to evaluate DRIVE as a tool to centrally set base stock levels. We plan a significant role in the AFMC Lean Logistics initiative and will work to integrate DRIVE into the Lean Logistics concept. We will also develop an integrated assessment capability into the DRIVE model to help users better understand the impact of DRIVE's asset allocation on their expected mission capability rates. We will increase our involvement with the SPDs and their use of WINLAM for WSPAR assessments. We will develop a prototype model for peacetime assessments for non-aircraft C4I reparable items based on item specific requirements and funding. We will complete our analysis of C-17 engine maintenance alternatives. Finally, we are entering new ground and attempting to determine how depot maintenance workload forecasts are made and see if we can identify ways to improve the forecasts to use for projecting manpower requirements

Planned projects in our 1995 program follow. These are in addition to the projects mentioned in the 1994 program that are continuing in 1995.

TITLE: *Lean Logistics*

CUSTOMER: HQ AFMC/LG-LL

OBJECTIVE: Lean Logistics is an Air Force initiative begun in March 1993 to speed up the repair, procurement, and transportation processes to provide better support to the end users at the lowest possible cost to the Air Force. All process improvements developed under the earlier Two-Level Maintenance initiative will be incorporated or further developed under Lean Logistics.

ANTICIPATED BENEFITS: We have been supporting this initiative in a number of ways. We helped identify problems with the reparable portion of the logistics process and propose potential solutions. We have estimated savings in the peacetime spares requirements if the resupply times can be shortened. We will be continuing a project begun in 1994 that involves the Lean Logistics concept of a Consolidated Serviceable Inventory (CSI). This concept consists of pulling much of the base stock back to a centralized buffer with very fast transportation of the stock back to the bases as needed. The expected benefits of a CSI include less maldistribution of stock among bases, less unnecessary work in progress in depot repair, and better focus at the depots on what really needs to be repaired. Our project will be looking at both the impacts on aircraft availability when using this CSI as opposed to other alternative management approaches and alternative ways of computing and managing the CSI stock levels.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Bob McCormick
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TITLE: *Integrating an Assessment Capability into DRIVE*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Integrate a peacetime/wartime assessment capability into DRIVE.

ANTICIPATED BENEFITS: DRIVE's objective function seeks to maximize the probability of achieving aircraft availability goals. The function is not easily understood by depot logistics managers and MAJCOM operational customers and a means of better understanding the impact of DRIVE's recommendations is needed. Integrating a peacetime/wartime assessment capability into DRIVE will help quantify customer support both before and after DRIVE's recommendations. It should help depot managers focus on problems limiting customer support.

ESTIMATED COMPLETION DATE: December 1995

ANALYSTS: Karen Klinger
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TITLE: *Automating DRIVE Distribution*

CUSTOMER: HQ AFMC/LGI

OBJECTIVE: Continue to support the effort to automatically ship items from the depot according to DRIVE priorities. The DRIVE Distribution Module (DDM) is operating at OO-ALC for F-16 avionics items and at OC-ALC for B-1B avionics items. It was installed at WR-ALC for LANTIRN and ALQ-135 band 3 reparable items late in 1994 with official usage to begin in January 1995. SA-ALC has tentative plans to begin using DDM with T56 engine parts early in 1995. The ALCs plan to gradually widen the range of parts that are distributed through the DDM. One of our major tasks in 1995 in support of automated DRIVE distribution is our continuing search for, or more probably, the development of a more automated source of squadron-specific application percentages for those items that do not apply to an entire MDS.

ANTICIPATED BENEFITS: Automating the assignment of DRIVE distribution priorities for depot shipment actions will reduce user workload, increase acceptance of DRIVE priorities and ultimately improve weapon system availability.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Barbara Wieland
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TITLE: *Peacetime Assessment Model for Non-Aircraft C4I Items*

CUSTOMER: HQ AFMC/DRD, SM-ALC/LHY

OBJECTIVE: To create a prototype peacetime assessment model for non-aircraft C4I Reparable items based on item specific requirements and funding.

RESULTS: A list of non-aircraft C4I weapon systems was developed by HQ AFMC/DR and supplied to HQ AFMC/XPS. We agreed to work with the Ground Tactical Air Control (GTAC) System Program office to develop a model that can be used to assess peacetime requirements for Reparable spares. SM-ALC/LHY provided a sample list of 20 GTAC Reparable spares end-items (weapon systems) that have National Stock Numbers (NSNs) in D041. We are currently developing an algorithm to build indenture level information based upon D041 data.

ANTICIPATED BENEFITS: Once an algorithm has been developed for sample non-aircraft C4I end-items and the process has been formalized (coordination with HQ AFMC/LGII and SM-ALC/LHY), then XPS will be able to create levels of indenture information for D041 items. We will be able to show the requirement and the "availability" of each RSD end-item. This will create a predictive peacetime assessment model to assist C4I System Program Directors (SPD) in evaluating and managing their weapon systems.

ESTIMATED COMPLETION DATE: Continuing through 1995

ANALYSTS: 1Lt Robert Block
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TITLE: *Workload Projection Manpower Planning*

CUSTOMER: HQ AFMC/LG

OBJECTIVE: Develop tools that will forecast Depot Maintenance Business Area (DMBA) workload at AFMC depots.

ANTICIPATED BENEFITS: Improved forecasting of workload will provide more efficient application of manpower resources.

ESTIMATED COMPLETION DATE: Continuing through 1995

ANALYSTS: Freddie Riggins
Don Casey
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TITLE: *WSPAR Support*

CUSTOMER: HQ AFMC/DR, HQ USAF/LGSS

OBJECTIVE: Gain expertise in using and applying the Windows Integrated Logistics Assessment Model (WINLAM) which SPDs use to produce capability assessments for Weapon System Program Assessment Reviews (WSPARs). The assessments help the SPDs determine if expected wartime performance meets required performance and how to evaluate options for overcoming shortfalls. Test various features of WINLAM. Assess the impact that changes in budgeting factors (model inputs) have upon system availability (model output).

ANTICIPATED BENEFITS: WINLAM employs a fairly complex series of mathematical formulas which relate logistics support investments to peacetime and wartime capability of a weapon system. Having resident expertise enables us to provide rapid technical assistance to AFMC users. Effective use of the WINLAM suite of models can help SPDs make good budgeting and funds allocation decisions for the systems they manage.

ESTIMATED COMPLETION DATE: October 1995

ANALYSTS: Michael Niklas
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TITLE: *Analysis of C-17 Engine and Module Maintenance Locations*

CUSTOMER: ASC/YCL (C-17 SPO)

OBJECTIVE: Provide the customer a report and briefing covering the completed evaluation of six maintenance location options for the C-17 engine, its Quick Engine Change kit components, and its modules.

ANTICIPATED BENEFITS: The Air Force (through proposals sponsored by the C-17 SPO) should select the most economical maintenance repair locations for the C-17 engines in accordance with this study's conclusions. The Propulsion SPO (ASC/LP) should investigate computations and procedures which would assure that the Air Force acquires the most economical mix of engine and module spares.

ESTIMATED COMPLETION DATE: October 1995

ANALYSTS: Harold Hixson
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TITLE: *Joint Logistics Support Center (JLSC) Requirements Analysis Support*

CUSTOMER: HQ AFMC/LGI, JLSC/MMD

OBJECTIVE: To provide modeling support to the JLSC. XPS is providing the official Air Force expertise on math models used to compute spare parts requirements. The JLSC objective is to consolidate all computer processes for DoD requirements to one system (or one set of systems) that can be easily maintained by one organization.

ANTICIPATED BENEFITS: Upon approval of the CY 95 Statement of Work, the Air Force will be tasked to primarily work in three areas. We are going to participate in the testing of the EOQ/VSL model by analyzing the impact of alternative parameter setting and desired functionality for Air Force consumable items. Our analysis of the best approach for Air Force initial requirements determination (IRD) is going to be expanded. We are going to look at the Navy's Aviation Retail Requirements Oriented to Weapon Replaceable Assemblies (ARROWs) model and the Air Force's Aircraft Sustainability Model (ASM). Both are readiness based and either model will greatly improve the Air Force's ability to compute IRD. We also are going to analyze the effects of including consumable LRUs in our recoverable item computation. This will enable us to gain a better understanding of their effects on readiness.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: William Morgan
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TITLE: *Retail Stockage Levels for the Air Force*

CUSTOMER: HQ USAF/LGSS, HQ AFMC/LGI, MAJCOM/LGS

OBJECTIVE: The Central Leveling System (D028) currently computes retail stockage levels for selected items. Several studies have shown the potential for improvements in the computational methodology used in D028. Further, the current D028 approach is not consistent with the aircraft availability approach of DRIVE. Our efforts will focus on determining which method would be best to use in concert with DRIVE in execution and to work with the customers to develop an implementation plan. Our work should also help with the problem of setting base levels faced by the Lean Logistics initiatives.

ANTICIPATED BENEFITS: This effort should lead to retail stockage postures which better support base availability goals.

ESTIMATED COMPLETION DATE: December 1995

ANALYSTS: Bob McCormick
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TITLE: *Readiness Based Initial Requirements Determination (RBIRD)*

CUSTOMER: AFSAC, OO-ALC/LAIM, SA-ALC/LFTE

OBJECTIVE: Apply readiness based sparing (RBS) to foreign military sales (FMS).

ANTICIPATED BENEFITS: Inventory reduction, spares cost savings, and improved aircraft availability in FMS requirements determination.

Last year, we worked with our customers at SA-ALC to develop a plan for incorporating RBIRD into the International Weapon Item Projection System (IWIPS). The IWIPS is the current FMS reparable sparing model used at SA-ALC. Plans are underway to enhance the IWIPS so that the data and models it contains can be accessed by contractors who supply parts and by other Air Logistics Centers (ALCs). In 1995, we will help incorporate RBIRD into the enhanced IWIPS, thereby providing a readiness based sparing requirements system that can be accessed by all FMS customers.

ESTIMATED COMPLETION DATE: December 1995

ANALYSTS: Karen Klinger
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TITLE: *RSD Banding for Effectiveness*

CUSTOMER: HQ AFMC/LG/FM/DR

OBJECTIVE: Develop a systematic process to aid AFMC in distributing Obligation Authority (OA) by ALC and Weapon System, and to provide item level guidance to the RSD item managers.

ANTICIPATED BENEFITS: We have developed and used an off-line system to artificially constrain the RSD requirement in order to optimally spend any amount of OA. This process is very time consuming and extremely dependent upon data which much be captured, stored, shipped and retrieved in a timely manner to be useful. Since the data is constantly being updated and is always in a state of flux, any change in the banding process which will bring it closer to the source of data will allow for more accurate computations.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Frederick Rexroad
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TITLE: *DRIVE Implementation Support*

CUSTOMER: HQ AFMC/LGI, ALC Product Directorates

OBJECTIVE: We will continue to provide user and data analysis support to the implementation of DRIVE through our roles as the Air Force technical OPR for the DRIVE model and technical consultant to the DRIVE Functional Integration Office and Program Management Office. DRIVE includes the original mainframe portion as well as the PC portion now called the DRIVE Distribution Module. Major projects planned include an analysis of availability goals impacts on DRIVE, continued implementation of automated distribution, support to the various Lean Logistics implementations which make use of DRIVE and analysis of quarterly model run asset assumptions. If time is available, we will begin a study of alternative model objective functions. In addition, we will continue to make model enhancements as necessary that could include inclusion of non-aircraft items, the addition of lower indentured (sub-SRU) items and, possibly, the implementation of depot-base trade-off logic.

ANTICIPATED BENEFITS: DRIVE provides a means of explicitly linking depot support to operational needs. It will prioritize near term depot repair and distribution actions to best support the expected needs of the operational units within the constraints of the corporate Air Force priorities and repair funding. We will help ensure that the technical solutions for developing and implementing DRIVE are sound and provide a system which meets our customers' desires.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Bob McCormick
Barbara Wieland
Capt Christian Dussault
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TITLE: *War Fighting Metrics for AFMC*

CUSTOMER: HQ AFMC/XP-AO, HQ AFMC/LGI

OBJECTIVE: Help AFMC determine its ability to provide required wartime logistics support to the operating forces and provide a convenient means to track the indicators of support at regular intervals. Indicators of AFMC's contribution to wartime mission effectiveness are desired at high levels (e.g., HORIZONS). They are also useful for MAJCOMS, System Program Directors (SPDs), and item managers.

ANTICIPATED BENEFITS: Timely, credible identification of potential problems with aircraft logistics support will lead to early solutions and more sorties. The area of logistics support addressed by this study is aircraft recoverable spares.

Last year we generated several War Fighting Metrics reports for HORIZONS and enhanced the system to model the effect of two levels of maintenance. Additional enhancements will be accomplished this year so that War Fighting Metrics can be used to assess aircraft availability associated with DRIVE, and to facilitate distributing the assessment system to SPDs.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Michael Niklas
Capt Christian Dussault
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(513) 257-6920; DSN 787-6920

TITLE: *Support for the Development and Implementation of WSMIS*

CUSTOMER: HQ AFMC/LGI, MSG/SXM, MAJCOMs

OBJECTIVE: Improve the quality and usefulness of the Weapon System Management Information System (WSMIS) by designing enhancements and solving technical problems. Take an active role in providing technical assistance to the WSMIS Program Office, the development contractors and users of the system.

ANTICIPATED BENEFITS: Improved accuracy, usefulness, and responsiveness of WSMIS in areas which most need our support. Our technical expertise and experience enable us to provide fast, effective corrections and enhancements to the system. Our main focus this year will be directed toward streamlining the Air Force wartime capability assessment system and providing inventory/usage summaries to help with reduction of war spares inventory.

ESTIMATED COMPLETION DATE: Continuing

ANALYSTS: Michael Niklas
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ACRONYMS

2LM	Two Level Maintenance
AAM	Aircraft Availability Model
AAPM	Aircraft Availability Procurement Model
ACC	Air Combat Command
ACIM	Availability Centered Inventory Model
ACSC	Air Command Staff College
AETC	Air Education and Training Command
AFAA	Air Force Audit Agency
AFIT	Air Force Institute of Technology
AFLMA	Air Force Logistics Management Agency
AFMC	Air Force Materiel Command
AFSAC	Air Force Security Assistance Center
AFWC	Air Force Wargaming Center
AIM	Alternatives to Intermediate Maintenance
ALAM	Airlift Logistics Assessment Model
ALC	Air Logistics Center
ALT	Administrative Leadtime
AMC	Air Mobility Command
AOB	Annual Operating Budget
API	Application, Program, and Indenture
APU	Auxiliary Power Unit
ARROWS	Aviation Retail Reqmts Oriented to Weapon Replaceable Assemblies
ASM	Aircraft Sustainability Model
AWM	Awaiting Maintenance
AWP	Awaiting Parts
BCR	Baseline Change Request
BCS	Bench Check Serviceable
BLSS	Base Level Self-Sufficiency Spares (now IRSP)
C4I	Command Control Communication Computer Intelligence
C-Ratings	Combat Ratings
CAIG	Cost Analysis Improvement Group
CAMS	Core Automated Maintenance System
CEMS	Comprehensive Engine Management System
CENTCOM	Central Command
CIM	Corporate Information Management
CLRU	Consumable Line Replaceable Unit
CLS	Contractor Logistics Support
COBRA	Cost of Base Realignment Actions
CONUS	Continental United States
COTS	Commercial-Off-The-Shelf
CPU	Central Processing Unit
CSE	Common Support Equipment
CSF	Critical Success Factor

CSI	Consolidated Serviceable Inventory
CSIS	Central Secondary Item Stratification
CSMS	Combat Supplies Management System
CSRD	Comm-Computer Systems Requirement Document
CVP	Conformance Verification Program
D028	Central Leveling System
D035	Stock Control System
D035C	Recoverable Assembly Management Process
D035K	Wholesale and Retail Receiving and Shipping Process
D041	Recoverable Item Requirements System
D042	Comprehensive Engine Management System
D087C	Sustainability Assessment Module
D087J/K	AFMC DRIVE Production System
D104	Worldwide Stock Balance & Consumption System
DDM	DRIVE Distribution Module
DDR	Daily Demand Rate
DFIO	DRIVE Functional Integration Office
DLA	Defense Logistics Agency
DLSIE	Defense Logistics System Information Exchange
DMAS	Dyna-METRIC Microcomputer Analysis System
DMBA	Depot Maintenance Business Area
DMIF	Depot Maintenance Industrial Fund
DMMIS	Depot Maintenance Management Information System
DMRD	Defense Management Review Decision
DMSC	Depot Maintenance Support Center
DoD	Department of Defense
DR	Deficiency Report
DRC	Dynamics Research Corporation
DRCQ	Depot Repair Cycle Quantity
DRIVE	Distribution & Repair in Variable Environments
DTDRIVE	DeskTop DRIVE
Dyna-METRIC	Dynamic Multi-Echelon Technique for Recoverable Item Control
EA	Executive Agent
EEIC	Element of Expense Investment Code
EIS	Executive Information System
EMS	Enhanced Multi-Echelon System
ENMCS	Engine Not Mission Capable - Supply
EOQ	Economic Order Quantity
EOQ/VSL	Economic Order Quantity/Variable Safety Level
ERO	Engine Review Organization
FAMMAS	Funding/Availability Multi-Method Allocator for Spares
FD	Functional Description
FMS	Foreign Military Sales
FOC	Full Operating Capability
GAO	General Accounting Office

GOSG	General Officer Steering Group
GPSS	General Purpose Simulation System
GWAM	Get Well Assessment Module
HOWMAL	How Malfunction
ICS	Interim Contractor Support
IM	Item Manager
IMDE	Integrated Model Development Environment
IMP	Inventory Management Program
IOC	Initial Operating Capability
IPD	Integrated Product Development
IPT	Integrated Product Team
IRD	Initial Requirements Determination
IRP	Inventory Reduction Plan
IRSP	In-place Readiness Spares Package (formerly BLSS)
IWIPS	International Weapon Item Projection System
IWSM	Integrated Weapon System Management
JEIM	Jet Engine Intermediate Maintenance
JEMS	Jet Engine Management Simulator
JLSC	Joint Logistics Systems Center
JR	Job-Routed
KAI	Kapos Associates Inc.
LAMs	Logistics Assessment Models
LANTIRN	Low Altitude Navigation Targeting InfraRed For Night
LCOM	Logistics Composite Model
LEAD	Logistics Enhanced Awareness Development
LL	Lean Logistics
LMI	Logistics Management Institute
LMS	Logistics Management System
LRU	Line Replaceable Unit
M&S	Models & Simulations
MAJCOM	Major Command
MC	Mission Capability
MDS	Mission Design Series
METRIC	Multi-Echelon Technique for Recoverable Item Control
METRICs	Measures of Performance
MIC	Maintenance Inventory Center
MICAP	Mission Capability
MOD-METRIC	Modified Multi-Echelon Technique for Recoverable Item Control
MRC	Major Regional Conflict
MRC	Module Replacement Center
MRP	Material Requirements Planning
MRSP	Mobility Readiness Spares Package
MSOR	Multiple Sources of Repair
MTBD	Mean Time Between Demands
MTBF	Mean Time Between Failure

NIIN	National Item Identification Number
NRTS	Not Reparable This Station
NSN	National Stock Number
O&M	Operations & Maintenance
O&ST	Order and Ship Time
OA	Obligation Authority
OCM	On-Condition Maintenance
OIM	Organizational Intermediate Maintenance
OMENS	Opportunistic Maintenance Engine Simulator
OPR	Office of Primary Responsibility
ORA	Operational Readiness Assessment
ORG	Operations Research Group
OSD	Office of the Secretary of Defense
OWLP	Overseas Workload Program
PA	Program Authority
PAA	Primary Aircraft Authorized
PACAF	Pacific Air Forces
PC	Personal Computer
PLT	Production Leadtime
PMC	Propulsion Managers Conference
PMO	Program Management Office
POM	Program Objective Memorandum
PPBS	Planning, Programming and Budgeting System
PRS	Propulsion Requirements System
PSE	Plan for Sustaining Engineering
QEC	Quick Engine Change
QPA	Quantity per Application
RADM	Resource Allocation Decision Model
RBIRD	Readiness Based Initial Requirements Determination
RBS	Readiness Based Sparing
RDB	Requirements Data Bank
REALL	Reallocation Module
REALM	Requirements/Execution Availability Logistics Module
REMIS	Reliability & Maintainability Information System
RIPIT	Requirements Interface Process Improvement Team
RIT	Reparable in Transit
ROME	Reliability Operations Maintenance Engineering
RRT	Required Resupply Time
RSD	Reparable Stock Division
RSP	Readiness Spares Package (formerly WRSK)
RTF	Readiness Task Force
SAM	Sustainability Assessment Module
SAMIS	Security Assistance Management Information System
SB&CR	Stock Balance and Consumption Report
SBSS	Standard Base Supply System

SC&D	Stock Control and Distribution
SCS	Stock Control System
SDF	Statistical Demand Forecasting
SECDEF	Secretary of Defense
SESAME	Selected Essential Item Stockage for Availability Method
SFDLR	Stock Funding of Depot Level Reparables
SMG	Supply Management Group
SMMC	Simultaneous Multi-Echelon, Multi-Indenture Computation
SOF	Special Operations Forces
SORCE	Simulation of Removals of Components & Engines
SOW	Statement of Work
SPD	System Program Director
SPO	System Program Office
SRAN	Stock Record Account Number
SRU	Shop Replaceable Unit
SSD	System Support Division
STOM	Supply to Maintenance
SWAP	Spares Wartime Assessment Procedure
TASC	The Analytical Sciences Corporation
TBD	To Be Determined
TLAM	Tactical Logistics Assessment Model
TLM	Two Level Maintenance
TNMCS	Total Not Mission Capable - Supply
TOC	Theory of Constraints
TQM	Total Quality Management
TRADES	Theater Repair & Distribution Execution System
UMMIPS	Uniform Materiel Movement & Issue Priority System
WINLAM	Windows Integrated Logistics Assessment Model
WFM	War Fighting Metric
WRM	War Readiness Materiel
WRSK	War Readiness Spares Kit (now RSP)
WSAM	Weapon System Availability Model
WSMIS	Weapon System Management Information System
WSPAR	Weapon System Program Assessment Review

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Distribution List

HQ AFMC		ALCs			
CC	1	OC-ALC/FM	1	AFIT/EN	1
CV	1	OO-ALC/FM	1	AFIT/LG	1
DPU	1	OO-ALC/FMFDR	1	AFIT/LAC	
DR	1	OO-ALC/LAIM	1	AFIT/YCL	1
DRA	1	SA-ALC/FM	1		
DRB	1	SA-ALC/LAVFT	1	AIR UNIVERSITY/EC	1
DRC	1	SM-ALC/FM	1		
DRJ	1	WR-ALC/FM	1	DTIC	2
DRM	1				
DRS	1	AFSAC/CC	1	DLSIE	2
DRT	1				
DRW	1	JLSC/MMD	1	AMXSY-LM	1
DRX	1				
EN	1	HQ USAF		RAND Corp.	1
ENM	1	LGS	1		
ENS	1	LGM	1	LMI	1
FMO	1	LGX	1		
FMR	1	XOO	1		
HO	1	SC	1		
IG	1	AFAFC/CC	1		
LG	1	AFLMA			
LGI	5	CC	1		
LGM	1	LGM	1		
LGP	1	LGS	1		
LGS	1	LGT	1		
LGT	1	LGX	1		
PA	1	LGY	1		
PK	1	XP	1		
SVPL	1				
ST	1	AFSAA/SA	1		
XP	3				
XPA	1	ACC/LG	1		
XP-AO	1	AMC/LG	1		
XPI	1	AETC/LG	1		
XPM	1	DLA/LO	1		
XPS	50	PACAF/DOQ	1		
XPV	1	PACAF/LG	1		
XPX	1	USAFE/LG	1		
MSG		AF ACADEMY/DF	1		
CC	1				
SMW	1				